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Pollution Solution

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Air pollution is affecting humanity and the environment on a massive scale. Three million deaths a year occur because of air pollution (“Air Pollution”). There are four main ways pollution may enter the air: natural, mobile, stationary, and area sources. Mobile and stationary sources are currently creating the most impact to the environment through their variety of chemical pollutants emitted. Air pollution is a problem that needs to be dealt with because it affects not only the environment but our health as well.

The most impactful stationary source of air pollution in the U.S. are coal plants. These plants emit sulfur dioxide, nitrogen oxides, and mercury along with others on smaller scales. Sulfur dioxide is the leading substance emitted from uncontrolled coal plants at over 14,000 tons a year (“Coal Power: Air Pollution”). This chemical penetrates the environments health by destroying crops, increasing the acidity of lakes and streams, as well as causing acid rain. All of these outcomes directly put the health of human beings in jeopardy; however, sulfur dioxide also hurts humans without having to move through the environment. This particular chemical helps form acidic particles that are inhaled into the lungs and thereby enter the bloodstream (“Coal Power: Air Pollution”). While the main consequences of long-term sulfur dioxide emission will be respiratory issues, extreme cases include the burning of the nose and throat (“Toxic Substances Portal—Sulfur Dioxide”).

Another dangerous pollutant emitted by coal plants is nitrogen oxides. A single plant with pollution controls typically produces 3,300 tons of nitrogen oxide a year (“Coal Power: Air Pollution”). As people are exposed to the smog and ground level ozone from this chemical, they become prone to respiratory diseases, similar to the reaction caused by exposure to sulfur dioxide. After long exposure to nitrogen oxides, people start to experience the burning of their lung tissue. Mercury is also a chemical released from coal plants that has more serious side effects. As much as 170 pounds of mercury may be released from an uncontrolled coal plant, which contaminates lakes and streams. It only takes 1/70 of a teaspoon of mercury to infect a twenty-five acre lake. This tiny amount of mercury in turn infects the fish in the lake or stream and makes them unsafe to eat. Mercury poisoning, brain damage, and heart problems, occur from this harmful pollutant being released into the environment (“Coal Power: Air Pollution”).

In addition to coal plants and other stationary sources of pollution, mobile sources or automobiles greatly contribute to the Earth’s contamination. In fact, with automobiles being the primary source, mobile pollution counts for over half of the air pollution in the United States (“NPS: Explore Nature”). Automobiles pose the same threats to humans as stationary sources, while producing different pollutants. Particulate matter is what gives smog its dark color and has been measured at approximately 1/10 the diameter of a human hair. Smog can both decrease visibility and affect the operation of large machinery, such as planes and cars. The microscopic size of smog particles also poses a serious threat to human life. Since they are so small, they are able to penetrate the lungs and cause multiple respiratory problems. While particulate matter can come directly from automobiles, it can also be a secondary pollution from sulfur dioxide and nitrogen oxides (“Cars, Trucks, and Air Pollution”).

Another pollutant that does damage to humans at the ground level are hydrocarbons. These can actually be beneficial when they take the form of gas in the upper atmosphere, but they cause problems when found elsewhere. On the ground level, hydrocarbons react with nitrogen oxides and sunlight to form ground-level ozone. The ozone is a necessary part of Earth’s atmosphere that provides protection from the Sun’s UV rays, but ground-level ozone causes a number of health problems, including irritation in the respiratory system, choking, coughing, as well as reduced lung capacity (“Cars, Trucks, and Air Pollution”).

These conditions are widespread among people living in Linfen, China, one of the most polluted cities in the world. The main contribution to the massive amount of pollution in this region is the city's coalmines. Linfen has not slowed down its economically prosperous coal production, and its citizens' are paying for it with their health. Recently, most coal dust pollution has come from illegal mines that are not regulated by the government, therefore producing mass amounts of pollution. The people of Linfen are exposed to so much pollution in one day that it is equivalent to smoking three packs of cigarettes. This has caused chronic lung problems and cancers on a wide scale ("The Most Polluted City on Earth: Linfen, China").

Planet Earth is heading down a dangerous road, and we can barely see well enough through the smog to steer the car. Major changes will have to be made to keep our planet healthy enough to sustain human life. If we keep going down this road, conditions will continue to escalate to uncontrollable proportions. I imagine the world well on its way to ruins by 2050. Smog will cover not only major cities but will have spread to developing countries from wind currents and coal mining development within southern Africa. China's population will see a drastic decline from cancers and respiratory diseases. This will affect the global economy, as many countries, including the U.S., are heavily dependent on China's factory workers. A decline in the economies of the world's powers will create vulnerability, which will give smaller countries a chance to take control and wreak havoc on their former oppressors. Overall, by 2050, the world will be in a downward spiral that will require major teamwork to overcome.

There are multiple techniques of pollution reduction that are in place now, such as solar panels, EPA regulations on factories, etc. There is also a concept in the making that is similar to steam power but uses carbon dioxide instead of steam. This would be an effective source of power because carbon dioxide is twice as dense as steam, therefore providing a much higher power density (Irfan). Also with twice the power density, more can be accomplished with less harmful emissions produced.

While carbon dioxide power is an effective pollution reduction technique I think it can be taken a step further to almost entirely eliminate pollution produced by a coal plant. With sulfur dioxide being the primary emitted pollutant, it could be used in place of steam or carbon dioxide to produce power for the plant. The sulfur dioxide being released would simply be redirected back into the plant to produce energy for the plant. With the density of steam at 0.6 kg/m^3 and sulfur dioxide at 2.63 kg/m^3 there would be a much higher power density produced, similar to the use of carbon dioxide. However, this technique would keep pollution out of the air and keep the coal plants up and running.

As stated earlier, pollution is a pressing problem that needs to be dealt with in order for the human race to continue surviving. Respiratory problems as well as cancers are already being contracted by people from the particulate matter, sulfur dioxide, and mercury that is emitted into the air every day. The way this issue should be handled is by targeting stationary and mobile sources of pollution. With these being the most destructive forms of emission, their reduction will contribute greatly to an increase in environmental health. Solutions to the pollution problem might also include re-envisioning the use of steam power and exploring other renewable resources. Without our intervention on Mother Nature's behalf, our resources will slowly fade away and leave us in ruins. This is an avoidable scenario, however, with just a little bit of effort put in by us and our fellow inhabitants of Earth.

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